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FEDERAL-GRANT RESEARCH
at the
STATE AGRICULTURAL
EXPERIMENT STATIONS

Projects in
PLANT PATHOLOGY
Part 17, Section c
Diseases of
Fruit Crops

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Compiled February 1958 by

The State Experiment Stations Division, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C., for use of workers in agricultural research in the subject-matter areas presented. For information on specific research projects write to the Director of the Station where the research is being conducted.

Issued June 1958

FEDERAL-GRANT RESEARCH

at the

STATE AGRICULTURAL EXPERIMENT STATIONS

Projects on

DISEASES OF FRUIT CROPS

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INTRODUCTION

This compilation is one of a series providing information on State agricultural experiment station research supported by Federal-grant funds appropriated annually by Congress under authorization of the Hatch Act of 1887, as amended and approved Aug. 11, 1955, and Section 204(b) of the Agricultural Marketing Act of 1946. It is prepared for use by research workers in the subject-matter areas presented. Only that part of each State's research program supported by Federal-grant moneys is included.

In addition to the Federal-grant moneys, the State experiment stations receive some Federal support through cooperative agreements or contracts with the U. S. Department of Agriculture. Information on such research, along with other departmental research, is available in the Central Project Office, Agricultural Research Service.

A substantial part of each State agricultural experiment station's research is supported with moneys appropriated by the respective State or Territorial Legislatures and through other forms of private and public financing. Information on current agricultural research at the stations which is not financed under the Federal-grant program or through USDA cooperation can be obtained from experiment station directors.

The information given in the series of Federal-grant compilations includes the title and objectives of each Federal-grant project pertaining to the subject given on the cover. The identification of each project gives the department(s) conducting the research, the station number of the project, and the number of the regional project if it is a contributing project.

Relevant regional projects, if any, appear at the end of the compilation. States having projects contributing to regional projects are indicated. The Roman numeral (and capital letter) refer to the location in the summary of the contributing project title and objectives. The States are grouped into four major regions. These are designated NC-North Central, NE-Northeastern, S-Southern, and W-Western. The capital letter "M" following the letters for the region indicates regional marketing projects.

DISEASES OF FRUIT CROPS

General

Calif. Insect Vectors and Their Relation to Virus Diseases of Deciduous Fruits and Berries of California. (1) Learn vectors of deciduous fruit trees and bush berries; (2) study life history and ecology of vectors; (3) learn host range of viruses by insect vectors; (4) investigate: differential efficiency among vectors and factors affecting efficiency, length of time insect vector must feed on a plant to acquire or transmit the virus; latent period of virus in vector, multiplication or lack of multiplifcation of virus in vector, ability of vectors to carry related and unrelated viruses in their bodies simultaneously; (5) control virus diseases by vector control.
Ent. & Parasitol. 1365-B

Calif. The Marketing of Deciduous Tree Fruits and Berries in Both Fresh and Processed Outlets as Influenced by So-Called Transit or Market Disorders, With Special Emphasis on the Physiological Effects of Control Treatments. To learn (1) effect of recommended control measures for pathogenic organisms on physiology of said fruits; (2) cause of post-harvest physiological disorders; (3) relationship of factors favoring development of disorders; (4) ways of preventing or reducing disorders; (5) ways to cause growers, shippers and processors to institute ways of eliminating disorders.
Agr. Econ., Pomol., Pl. Path. 1656

Idaho The Identity and Control of Cankerous Aerial Disorders in Orchard Trees. To (1) determine the presence and distribution, with respect to host and locality, of various kinds of cankerous aerial disorders in orchards of Idaho deemed serious enough to warrant investigation; (2) determine causes of disorders; (3) determine satisfactory and practical curative or preventive measures for disorders found and deemed serious enough to warrant commercial control programs; and (4) release of this information through proper channels.
Pl. Path. 250 Coop. ARS

Ind. Identification and Control of Tree and Small Fruit Virus Diseases in Indiana. (1) Survey by indexing fruit varieties, clonal stocks, and native plants of fruit species for presence of virus disease; Learn (2) host range and role of host species and environmental factors in disease syndrome of fruit virus diseases; (3) spread and economic loss occasioned by virus diseases in fruit plants; (4) study control of fruit virus diseases by heat and chemical therapy; (5) maintain virus-free sources of important fruit varieties for small-quantity distribution to propagators within the State.
Hort., Bot. & Pl. Path. 882 (NC-14)

Ind. Studies of Etiology, Epidemiology and Chemical Control of Fruit Diseases. Learn effectiveness of (1) fungicides, combinations of fungicides, and of additives for control of tree fruit and small fruit diseases; (2) nematocides for control of nematodes in small fruit and tree fruit plantings. Obtain (3) information on developmental physiology of tree fruits and relate changes in physiology to susceptibility to rotting organisms; (4) additional information on factors favoring development and spread of B. ribis and related fruit rotting organisms.
Bot. & Pl. Path. 953

Ind. Improvement of Tree Fruits and Small Fruits by Breeding for Disease Resistance, Quality, and Other Characters. (1) Search for and evaluate disease resistance and other desirable horticultural characters in tree fruit and small fruit species; (2) learn genetic basis for important pathogenicity and resistance factors in pathogens and hosts, and genetic bases for other desirable horticultural characters used in breeding programs; (3) examine chromosomal condition in breeding stocks and induce changes in numbers where necessary to effect improvement by interspecific hybridization and polyploid breeding; (4) breed commercially desirable tree and small fruit varieties through hybridization of desirable germ plasm.
Hort., Bot. & Pl. Path. 960 Coop. ARS

Ky. The Development of New Fruits Adapted to Kentucky. To develop fruit varieties adapted to Kentucky and superior in quality, food value, and resistance to disease.
Hort. 555

La. Production, Breeding and Handling of Tree and Small Fruits with Particular Reference to Figs, Pears and Miscellaneous Fruits. To assemble and evaluate existing varieties in Louisiana; improve these varieties through breeding and test them on various markets for fresh and processed fruits.
Hort., Food Technol. 822 Coop. ARS

Maine Virus Diseases of Deciduous Tree Fruits. (1) Learn extent and importance of virus diseases in apple and cherry varieties grown in Maine; (2) study epidemiology of disease and insect vectors involved; (3) develop an accurate method of indexing deciduous tree fruits for virus infection; (4) devise a workable method of control.
Bot. & Pl. Path. 55 (NE-14)

Mich. Tree Fruit Virus Diseases.--Stone Fruit Viruses Diseases.--Pome Fruit Virus Diseases. To (1) learn virus content and extent in stone-fruit stock by further survey and indexing; (2) learn new or undiscovered viruses by indexing trees with unusual symptoms; (3) learn more accurately, host ranges of several important viruses; (4) investigate possibility of new and more effective control measures; (5) investigate viruses of rootstocks; and develop disease-free root stock sources; (6) develop and maintain disease-free sources of varieties of stone fruits; (7) investigate stony-pit virus of pears; and (8) learn host range of viruses on Hyslop crabapple.
Bot. & Pl. Path. 36 Coop. ARS

Minn. Fruit Diseases. 2. Identification, Occurrence, Distribution and Severity of Viruses. 3. Miscellaneous Diseases of Fruit. 5. Diseases of Small Fruits and Methods of Control. 12 Diseases of Tree Fruits and Methods of Control.
Pl. Path. & Bot. 2206

Minn. Fruit Diseases.--2. Identification, Occurrence, Distribution and Severity of Viruses. To determine the identification, occurrence, distribution and severity of viruses of fruit and investigate the host range and factors responsible for their multiplication and production.
Pl. Path. & Bot., Hort. 2206-2

Minn. Fruit Diseases.--3. Miscellaneous Diseases of Fruit. To study miscellaneous fruit diseases in detail so as to determine their effect upon the fruit industry.
Pl. Path. & Bot., Hort. 2206-3

Minn. Fruit Diseases.--12. Diseases of Tree Fruits and Methods of Control. To determine (1) resistance of pear varieties and seedlings to fire blight; and (2) fungi causing wood decay in apples in Minnesota and the conditions which favor the development of decay.
Pl. Path. & Bot. 2206-12

Minn. Epidemiology of Leaf Spots and Other Foliage Diseases of Crop Plants.--5. Tree Fruits and Small Fruits. To gain information on prevalence, etiology, epidemiology, physiologic specialization and methods of control of tree and small fruit diseases.
Pl. Path. & Bot. 2219-5

Minn. Cause and Control of Biological and Chemical Deterioration of Agricultural Products in Storage.--4. Fruits. To determine: (1) microorganisms or factors responsible for fruit deterioration; (2) main factors governing development of deterioration and nature of deterioration; and (3) chemicals or control methods.
Pl. Path. & Bot. 2220-4

Miss.

Investigation of the Diseases of Fruit Crops and Their Control. To (1) identify and study pathogenic organisms concerned with fruit diseases in Mississippi; (2) study factors concerned with early "dying-out" of peach trees within orchards; (3) develop effective and simple spray program for control of peach scab, bacterial spot, and brown rot of peach; apple bitter rot and blotch; and other fruit diseases as deemed feasible; and (4) explore and study other methods of practical disease control among various fruit crops as deemed necessary.
Pl. Path. HL-8

N. H.

Breeding Improved Fruits for New Hampshire. Develop improved varieties of fruit, including: (1) hardier peaches; (2) later ripening apples, and provide a suitable mate for McIntosh with greater hardiness and more disease resistance; (3) better raspberries and blackberries; (4) late pear variety equal to Clapp's Favorite with more winter hardiness and blight resistance; and (5) later ripening strawberries of superior quality.
Hort., Bot. 74

N. J.

Tree Fruit Diseases and Their Control. To test (1) protective and eradicant value of several new fungicides in apple scab control; (2) promising fungicides with insecticides for compatability; (3) new materials against cherry leaf spot, peach bacterial spot, and peach brown rot; (4) promising new fungicides or dust in packing house to control brown rot during transit; and (5) to study effect of nitrogen, potassium and minor elements on susceptibility of peaches to brown rot and bacterial spot.
Pl. Path. 451

N. Y.
(Cornell)

Nematodes Parasitic on Roots of Fruit Trees. (1) Assess the damage to fruit trees by plant pathogenic nematodes; (2) devise control methods for diseases caused by nematodes; (3) clarify life histories of plant parasitic nematodes, learn influence of environmental factors on their development and pathogeniticy, clarify relationships between nematodes and other organisms in causing diseases of roots of fruit trees.
Pl. Path. 188 (NE-34)

Ohio

The Control of Fruit Diseases.--2. The Control of Fungus Diseases of Stone and Small Fruit Plants. To (1) learn effectiveness, safety and economic value of new fungicides for control of fungus disease of stone and small fruits; and (2) develop more effective and cheaper fungicide spray schedules for peaches, plums, and cherries.
Bot. 15-2

Ohio	The Control of Fruit Diseases.--3. The Control of Bacterial Diseases of Fruit Plants. To develop (1) practical and effective control of fireblight disease of apples and pears; and (2) effective control of bacterial spot of peach and other stone fruits. Bot. 15-3
Utah	Orchard Rootstocks Investigations. To secure better adapted, hardier, higher yielding, longer lived, earlier bearing, disease and insect resistant root stocks for orchard fruits for Utah conditions. Hort. 339
Va.	Fungicide and Insecticide Compatibilities in Orchard Spraying. To determine (1) fungicidal effectiveness of standard fungicides; (2) pesticidal potency of insecticides and acaricides; (3) phytotoxic character of combinations of these products used in simultaneous combinations; and (4) safety and effectiveness of certain fungicides when used in alternating sequence. Ent., Pl. Path. & Physiol. 86020
Wash.	Fruit Spot and Related Physiological Disorders of Fruits. To study fruit spot and related physiological disorders of fruits to determine cause and get data on value in the control of such disorders. Hort. 426
Wis.	Orchard Fruit Diseases and Their Control, Especially Apple Scab, Fireblight and Rust and Cherry Leaf Spot and Brown Rot. To develop a basis and more effective method for control of the chief destructive diseases of fruits in Wisconsin. Pl. Path. 301-a
Wis.	The Quality of Fresh and Processed Fruit as Affected by Orchard Sprays. To (1) determine effects of spray chemicals used in apple and cherry orchards on color, finish, texture, firmness, taste, and storage life of fresh and processed fruit; and (2) relate findings to preferences or needs of consumers and processors. Dairy & Food Indus., Pl. Path. 952

Apples and Pears

Del.

Botryosphaeria Rot of Apple in Storage. To obtain information on (1) life history of the causal organisms, Botryosphaeria ribis, on apples entering, during, and after cold storage; (2) development of rot under cold storage and post-storage conditions; (2) control of rot by treatment of apples before entering and when leaving cold storage.
Pl. Path. 16-P

Del.

Apple Fruit Rots. To obtain more information on the life-histories of the causal organisms, and to develop effective, economically sound control measures.
Pl. Path. 43-P

Ill.

Inheritance and Breeding of Commercially Important Characters in the Apple. To (1) develop commercial varieties with a higher level of disease resistance adapted to Illinois, ripening at different seasons and suited to specific purposes; and (2) study the inheritance of characters.
Hort. 65-323

Maine

Organic and Other Fungicides as Spray Materials for Apples. To evaluate organic fungicides as to scab control and such side effects as chlorophyll content, tree growth, yield rate, fruit quality, compatibility, and residual effects in the soil.
Pl. Path. 29

Mo.

Pesticides for Disease Control and Their Effect on Fruit Finish in Apples. To (1) test several antibiotics in two concentrations and in different formulations for control of fire blight on apples and pears; (2) determine effectiveness of zineb and captan against cedar rust; (3) determine value of lead arsenate in control of sooty blotch and extent to which disease can be controlled by beginning spray applications after disease shows; (4) determine compatibility of phenyl mercury - protective fungicide combinations from standpoint of spray injury and control of apples scab; and (5) determine effect of several more efficient fungicides on fruit finish of apples with the view of developing safe spray programs which are efficient and economical.
Hort. 232

N. H.

Virus Diseases of Apple Trees. Survey virus diseases and similar disorders of apples in State, and learn by transmission studies if disorders are due to viruses; (2) develop an accurate, acceptable method for indexing apple trees; learn (3) properties of viruses involved, including methods of transmission, and relation to other fruit tree diseases; (4) economic losses due to viruses and related diseases; (5) virus content of bodystocks or interpieces and rootstocks used in hardy bodystock trees.
Bot., Hort. 119 (NE-14)

N. Y.
(Cornell)

The Fire Blight Disease of Pome Fruits and Its Control. 1. Influence of Soil and Cultural Conditions on Disease Development. 2. The Susceptibility of Rootstocks and Tree Framework to the Disease. 3. Factors Influencing Development of Infections and Methods of Prevention.
Pl. Path. 129

N. Y.
(Cornell)

The Fire Blight Disease of Pome Fruits and Its Control.--1. To determine (1) if soil texture and moisture relations may influence disease development, independent of influence on growth of trees; (2) influence of different nutrient levels and balance on development of disease in trees on soils different in type and moisture, and determine effect of varying soil nutrient balance on disease; (3) influence of different cultural practices as to cultivation, sod culture, and cover crops on disease development; and (4) apply information to reduce disease development in commercial orchards.
Pomol., Pl. Path. 129-1

N. Y.
(Cornell)

The Fire Blight Disease of Pome Fruits and Its Control.--2. The Susceptibility of Rootstocks and Tree Framework to the Disease. To (1) develop resistant rootstock and framework for pear trees so that when infections occur they will not extend into all branches of trees and prevent infections in roots; and (2) determine relative susceptibility of different rootstocks being developed for apples, and search for resistant selections, studying method of propagation to learn if this does influence development of infection.
Pomol., Pl. Path. 129-2

N.Y.
(Cornell)

The Fire Blight Disease of Pome Fruits and Its Control.--3. Factors Influencing Development of Infestations and Methods of Prevention. To (1) determine influence of temperature and humidity on initiation of infections in blossoms and development of disease; (2) find better bactericides for sprays and to improve timing of applications for blossom blight control; and (3) prevent infections in growing shoots by control of infections already occurred by application of systemic bactericides or growth substances, or other means.
Pl. Path., Pomol. 129-3

N. Y.
(State)

Virus and Virus-Like Abnormalities of Pome Fruits. Learn (1) exact etiology of possible virus or virus-like disorders of pome fruits; (2) relationships of pome fruit viruses to each other and to viruses affecting other deciduous tree fruits; (3) influence of environment on development of symptoms of virus diseases of pome fruits; (4) screen commercial varieties and species of pome fruits for tolerance or resistance to pome fruit viruses: (5) develop rapid, inexpensive, and reliable methods for indexing for viruses of pome fruits; (6) establish sources of virus-free propagating materials of important pome fruit clones; provide nurseries with propagating materials; (7) devise practicable control measures to prevent spread of virus diseases in the nursery and in the orchard.
Pl. Path., Pomol. 73 (NE-14)

N. C.

Improved Control of Apple Diseases Under North Carolina Conditions. To (1) study under N. C. conditions the life histories of apple pathogens and seasonal development of diseases that they cause in order to obtain a sound basis for development of most satisfactory control measures; and (2) develop a satisfactory disease control program that will enable growers to decrease production costs, produce increased yields of fruit of highest quality, and market better apples.
Pl. Path., Ent. H-90 Coop. SCS

Ohio

The Control of Fruit Diseases.--1. The Evaluation of Fungicides and the Timing of Fungicide Application for the Control of Apple Scab and Other Fungus Diseases of Apple. To (1) learn effectiveness, safety and economic value of new fungicides used in sprays for the control of apple scab and other fungus diseases of apple; (2) learn best timing of fungicide sprays for control of each fungus disease of apple; (3) learn effectiveness of new fungicides used after infection has been initiated; (4) develop, if possible, effective abbreviated fungicide spray schedule; i.e., one which consists of less frequent spray applications and which therefore would be more economical; (5) learn effectiveness and safety of new fungicides when applied to apples as concentrates and in low gallonages; and (6) learn compatibility of new fungicides with recommended insecticides used on apples.
Bot. 15-1

Ohio

Multiplication, Preservation and Determination of Potential Value of Pear Varieties for North Central States Introduced into and Collected Within the United States. To (1) determine adaptability of newly introduced or recently produced pear varieties to the environmental conditions of the North Central States; and (2) preserve those varieties having potential value either for plant breeding or for other programs in the North Central States where true-to-name source of plant material is necessary.
Hort. 73 (NC-7)

Ohio

Apple Scald Control by Means of Oxidizing and Absorbing Agents at the Surface of the Skin. To investigate the use of (1) wax emulsions containing oily and greasy substances such as refined mineral oil and petrolatums as absorbers for volatiles causing scald; (2) reactive gases introduced into the atmosphere to combine with or oxidize the volatiles causing scald.
Hort. 153

Oreg. Maintenance of a Repository for Germ Plasm of Pears and the Evaluation of a New Germ Plasm. To receive potentially valuable plant materials of pear species, etc., from primary sources or regional introduction stations for propagation, maintenance and evaluation of germ plasm; (2) make available to fruit breeders or other scientific personnel, propagations by buds, scions, or grafter trees; (3) initiate program of evaluating, multiplying, and distributing introduced types, varieties and strains of pears.
Hort. 46-4 (W-6) Coop. Regional Plant Introduction Station

Tenn. Breeding for Fire Blight Resistance. To develop varieties of pears, apples, and quinces combining resistance to fire blight and resistance to other diseases with commercial quality.
Hort. 117

Va. Breeding New Varieties of Apples Especially Adapted to Conditions in Virginia. (1) Develop new varieties of apples well adapted for commercial production; study types late in season of blooming, resistant to disease and insects; (2) conduct fundamental work including studies of pollination values and cytological relations of Virginia apple varieties and production of polyploid types of apples.
Hort. 86003

W. Va. Apple Measles. To secure a better knowledge of the nature and cause of the diseases of apple bark commonly known as "measles" with the view of eventually working out methods of control.
Pl. Path., Hort. 8

W. Va. Black Root Rot of Apple. To develop adequate measures of control.
Pl. Path. 9

W. Va. The Effect of Chemical Spray Schedules on the Quality and Quantity of Apples Produced. To determine (1) effect of various insecticides and fungicides and time of application on the quantity and quality of fruit produced; and (2) relative cumulative as well as current season's effect of various spray schedules on fruit set, yield, color, and finish.
Ent., Pl. Path. 83

W. Va. Virus Diseases of Pome Fruits in Addition to Those of Stone Fruits. (1) Learn extent and importance of virus diseases in apple varieties grown in State; (2) find suitable indexing hosts for visuses; (3) learn rates and methods of natural spread of viruses and devise means of preventing spread and reducing injury.
Hort., Pl. Path. 89 Supplement

Small Fruits

Ark. The Identification, Epidemiology, and Control of Plant-Borne Pathogens of Strawberry. (1) Identify various components of virus complex occurring in Arkansas strawberry plantings; (2) study methods of producing disease free plants with view of improving and simplifying existing procedures; (3) learn importance of virus diseases to production of berries; (4) study movement and spread of viruses into virus-free plantings; (5) study relationships of other plant-borne pathogens to virus-free plant production program; (6) develop disease resistant varieties for local commercial requirements through hybridization and selection.
Pl. Path. 412

Calif. The Nature of and Predisposing Factors for "Wetness" of Table Grapes and the Relationship of This Condition to Market Quality. To (1) specify what wetness is; (2) determine significance of moisture of condensation in relation to wetness; (3) determine role of condensed moisture in predisposing the fruit to decay; (4) determine significance of berry juice in relation to wetness; (5) evaluate relationship of rough handling to berry injury in terms of amount of wetness; (6) determine relationship between wetness from injury and decay incidence; (7) determine if use of excessive amounts of SO_2 for fumigation predisposes fruit to wetness; (8) determine significance of microscopic injuries such as insect punctures in relation to wetness; (9) learn changes in permeability of the skin to juice during stages of senescence of fruit during storage; (10) learn if wetness is correlated with maturity of fruit when harvested; and (11) learn influence of different degrees and types of wetness upon market quality of fruit as indicated by wholesale and retail prices.
Agr. Econ., Hort., Pl. Path. ES 456 Coop. ARS

Ill. Investigation of Red Stele Root Rot of Strawberry. (1) Study etiology of red stele disease; (2) learn how many strains of red stele pathogen are present in State; (3) study its control by use of chemicals; (4) cooperate with Mr. Chester Zych of Horticulture Department in an evaluation of red stele resistance in his strawberry breeding and evaluate any new varieties developed in other areas under State conditions.
Pl. Path. 68-378

Maine The Biology of Low-Bush Blueberry Soils. To investigate the influence of various soil-inhabiting organisms on the blueberry plant and effect of cultural practices on soil-inhabiting organisms.
Pl. Path., Agron. 51

Maine Identification and Control of the Fungi and Viruses Causing Disease in Low-Bush Blueberries. (1) To study numbers and kinds of virus disease present and determine pathogenicity of fungi isolated from diseased blueberry plants; (2) learn what insect vectors are involved and develop control measures.
Pl. Path., Ent. 99

Mass. Black-Root Rot of Strawberries. To determine the cause of black-root rot of strawberries and to find effective methods of control.
Pomol., Hort. 98 Coop. ARS

Mass. Small Fruit Disease Investigation. Establishment of more practicable and less expensive methods of applying chemicals. Clarification of most effective time of fungicide applications. Test new fungicides as they are presented. Continue study of role played by oxygen in fruit set and keeping quality. Life cycle and control studies will be made of pathogens causing heretofore unknown diseases. Investigate eradicant fungicides and chemotherapeutants.
Cranberry Station 121

Mich. Strawberry Red Stele Root Rot Disease: To Study Factors of Field Spread and Identification, Resistance, Physiology of the Causal Organism, New Methods of Control, and to Test New Selections Developed Through the Breeding Program for Resistance. To (1) develop technique for red stele diagnosis in field during any period of year; (2) investigate methods to learn resistance in varieties and selections which will lead to more rapid technique; (3) study physiology of causal organism which would have direct bearing on breeding and methods of control; (4) evaluate methods of eradicating the disease once present in soil, to aid in reclaiming many infected areas for strawberry growing; and (5) determine if selections developed are red stele resistant.
Bot., Hort. Pl. Path., 810

Minn. Fruit Diseases.--5. Diseases of Small Fruits and Methods of Control. To make provision for handling emergency diseases which may develop on small fruits, after the Office has been advised that more than preliminary investigations are to be undertaken.
Pl. Path. & Bot., Hort. 2206-5

Mo. Downy Mildew and Black Rot Control on Grapes. To find a fungicide or a fungicide combination that will effectively control both blackrot and downy mildew with little or no phytotoxic effects.
Hort. 194

N. H. The Development, Improvement and Maintenance of Blueberry Fields. To learn (1) reliable procedures for developing and maintaining blueberry plants on abandoned farm lands and other available areas; (2) optimum cultural practices, particularly fertilizer requirements, weed control, and the control of insects and diseases; (3) the ecological factors significantly associated with successful blueberry production; and (4) to create improved stands through selection and breeding.
Hort. 56

N. H. Virus Diseases of Strawberries in New Hampshire. To determine (1) what wild species and cultivated varieties of strawberries are infected with viruses, and to locate virus-free clones of the varieties for propagation; and (2) effect of viruses on plant propagation and on fruit yields of cultivated varieties.
Bot. 63 Coop. ARS

N. J. Blueberry Diseases and Their Control. (1) Learn causal agents of blueberry diseases, life histories of present imperfectly understood pathogens, and influence of environment on development of diseases; (2) develop control measures based on above determinations; (3) learn effect of chemicals used in disease control on plant growth, yields, and fruit quality; (4) develop procedures for screening large numbers of seedlings in search for resistance to major blueberry diseases.
Pl. Path. 471 Coop. ARS

N. J. Cranberry Diseases and Their Control. (1) Learn causal agents of cranberry disease, life histories of present imperfectly understood pathogens, and influence of environment on disease development; (2) develop controls for above determinations; (3) learn effect of chemicals used in control on plant growth, yields, and fruit quality.
Pl. Path. 472 Coop. ARS

N. J. Diseases of Strawberries, Grapes and Cane Fruits. To learn (1) causes, extent of losses, and control of disease of strawberries, grapes and cane fruits; (2) effect of chemicals in disease control on plant growth, yields, and fruit quality; (3) influence of soil temperature on development of root and vascular disease of strawberries.
Hort., Ent., 480 Coop. ARS

N. Y. (State) *Taxonomic and Host Range Studies With Pure-Lines of the More Important Plant Parasitic Nematodes Associated With Small Fruit Diseases*. (1) Develop techniques for obtaining and maintaining pure-lines of plant parasitic nematodes; (2) obtain pure-lines of important plant parasitic nematodes found on small fruit crops; (3) maintain these pure-line populations at Geneva and other institutions needing them; (4) learn range of variability within pure-line populations; (5) compare range of variability between several pure-line populations derived from populations presently considered to represent a single species; (6) determine host ranges of pure-line populations, with emphasis on physiological differences that might exist within species.
Pl. Path.8A (NE-34)

N. C. *Blueberry Breeding*. To originate blueberry varieties for North Carolina and the Southeast, emphasizing: (1) very early to midseason commercial varieties with improved fruit and plant characters such as greater vigor and productiveness, better adaptation to local conditons, resistance to diseases, and larger bluer, better flavored fruit; (2) varieties ripening from very early to very late for home use and local market for all sections of the State; and (3) evaluation of various crosses for potential value as sources of superior selections, and for information on inheritance of economic characters to improve breeding.
Hort. 82 Coop. ARS

Okla. *The Improvement of Bramble Fruits by Breeding*. To (1) secure varieties of promise and hybridize in attempts to produce seedling for adaptation and resistance; (2) collect and maintain a test planting of recommended varieties and evaluate newly introduced ones; and (3) disseminate material which has indicated desirable qualities.
Hort. 595

Oreg. *Diseases of Small Fruits*. 1. Virus Diseases of Strawberry. 3. *Raspberry Yellow Rust*.
Bot. & Pl. Path. 137

Oreg. *Diseases of Small Fryits.--1. Strawberry Viruses.* To (1) determine possible importance of highly resistant varieties such as Rockhill, as natural reservoirs of inoculum for susceptible varieties; (2) determine factors influencing the expression or masking of virus symptoms; (3) determine response of strawberry species (*Fragaria bracteata*, *F. ovalis*, *F. cuneifolia*, *F. chiloensis*, *F. vesca*), and other closely related native herbaceous plants (*Potentilla gracilis*, *P. anserina*, *P. glandulosa*, *Horkelia congesta*, *Geum macrophyllum*, etc.) when inoculated with strawberry viruses, and their importance as reservoirs of inoculum; also certain other species (*Rosa nutkana*, *Rubus leucodermis*, *R. laciniatus*, *R. idaeus*, *R. sp.*, *Medicago sativa*, etc.); (4) determine possibility of inactivation of strawberry viruses by means of chemical therapeutics; (5) test varieties and selections carrying different components of virus complex for vigor, productiveness and longevity under field conditions; (6) develop and maintain virus-free foundation stocks of chief commercial varieties and unreleased USDA hybrids under vector proof conditions; and (7) determine possibility of preventing or slowing spread of strawberry viruses by controlling insect vector, *Capitophorus fragaefolii* (ck.).
Bot.& Pl. Path., Ent. 137-1 Coop. ARS

Oreg. *Diseases of Small Fruits.--3. Raspberry Yellow Rust.* To determine (1) how to control rust; (2) the economic value of yellow rust control; and (3) whether a spray program for control of yellow rust can be based on the developmental stage of the causal fungus rather than the development stage of the host plant.
Bot. & Pl. Path. 137-3

Pa. *Breeding Improved Varieties of Raspberries.* To (1) breed improved raspberries having resistance to freezing, disease, and insects, and desirable horticultural characteristics; (2) determine types and extent of virus infection; (3) identify and study insect vectors causing transmission of viruses; and (4) study inheritance of certain characteristics.
Hort., Zool., Ent., Bot. 1094 (NE-9)

Tenn. *A Comparative Study of Inheritance in the Cultivated Raspberry With Reference to Certain Diseases and to Fruiting Habits.* To determine the comparative values as parents of certain cultivated red raspberries when crossed with Van Fleet or other hardy types in the production of disease resistant, productive, and desirable hybrids.
Hort. 118

Tenn. Development of Red Stele-Resistant Strawberries. (1) Learn resistance of strawberries to red stele under State conditions: (2) develop berries resistant to red stele with satisfactory quality for State; (3) conduct biological studies with the organisms that will assist in accomplishment of above objectives.

Pl. Path. 162

Tex. Improvement of Bramble Fruits for Texas. Breed and test varieties of bramble fruits adapted to home and commerce. Study pathological and physiological diseases of same, with reference to sterility factor of Lawton variety, to learn causes and control methods. Study chemical weed control and methods of application with brambles.

Hort., Pl. Physiol. & Path. 1030

Vt. Strawberry Breeding and Variety Trials. (1) Find through varietal tests or originate improved varieties adapted to northern conditions; (2) learn parental varieties that will give late ripening varieties and those superior in early and mid-season ripening; (3) learn relative hardiness and disease resistance of varieties and educate growers to this.

Hort., 60 Coop. ARS

Wash. Pathology and Control of Raspberry Crowngall. To answer the following questions about crowngall on the Puyallup variety of raspberry: (1) how serious is injury caused by galls on the root system; (2) what is risk of spreading the pathogen to crowngall-free plantings; (3) what is relation of crowngall in raspberry to other susceptible crops grown in same areas; and (4) can effective measures be developed for reducing injury and risk of spreading the pathogen.

Pl. Path. 1226

Wis. Development of Improved Varieties and Strains of Strawberries Adapted to Wisconsin. To develop (1) new varieties of strawberries adapted to Wisconsin conditions; (2) superior strains of available varieties through virus indexing and nematode control program.

Hort., Pl. Path. 939

Stone Fruits

Calif. Factors Influencing the Re-Establishment of Peach Orchards on Old Peach Soils. To discover and devise methods for preventing the peach replant growth depression.
Pomol. 1126

Calif. Separation of Individual Viruses from Complexes Latent in Many Stone Fruit Varieties and Rootstocks. To (1) obtain pure cultures of ringspot, sour cherry yellows, and prune dwarf viruses; (2) determine effects of separate viruses and effects of various combinations of these viruses on stone fruit trees; and (3) maintain pure cultures of viruses for other research in this and other States.
Pl. Path. 1584 (W-22) Coop. ARS

Calif. The Canker Complex of Stone Fruit Trees - Etiology, Environmental Relations and Control. (1) Learn if canker disease of stone fruits is caused by a single bacterial species or by several closely related species and if fungus species sometimes associated with canker symptoms are of primary or secondary importance; (2) importance of certain physiological factors induced by microorganisms associated with canker in occurrence of disease in its various phases; (3) study effect of soil type, nutrition, soil moisture, soil temperature, nematode and soil micro-organisms, and possible soil toxins on development of canker phase of diseases; (4) learn nutritional needs of microorganisms associated with different phases of canker complex; (5) time and method of natural infection by bacteria commonly associated with disease and the environmental conditions favoring infection; (6) from above, formulate an effective control program for disease or diseases on various stone fruit hosts.
Pl. Path. 1714

Colo. Diseases of Fruit Trees. To (1) investigate virus diseases of stone fruits, especially peach mosaic and Western X; (2) investigate distribution and severity, nature of infection, and spread, and possible control of Cytospora gummosis of peach; and (3) provide an adequate fungicide testing program for control of fire blight, powdery mildew, Coryneum blight, Cytospora gummosis of peach.
Bot. 79

Colo. The Characterization of Strains of Peach Mosaic Virus and Changes Associated With the Host-Cell Metabolism of Infected Plants. To (1) isolate abnormal proteins associated with plants infected with different strains of peach mosaic virus; (2) characterize the strains of the isolated virus and try to establish their infectivity; (3) determine changes in host-cell metabolism and try to correlate changes with different strains of the virus.
Bot., Pl. Path. 235 (W-22)

Ga. Control of Peach Diseases. (1) Test materials and methods for obtaining better disease control combined with good color and finish on peaches; (2) cooperate with various agencies in this State and nearby States in the annual revisions of the peach spray schedule.
Pl. Path. 115

Idaho Behavior and Effects of the Virus Complexes Latent in Stone Fruit Varieties and Rootstocks. A. Prevalence--To (1) survey the State of Idaho for all types of abnormal conditions of plums and prunes that are not now understood; (2) map individual orchards for closer observation of field behavior of disorders found there; (3) conduct transmission studies for separation of these disorders that are virus in nature from those that fail to transmit to other hosts whether the hosts be the same or different varieties; and (4) determine what viruses are responsible for transmissible diseases found and to investigate correlation between these and the sour cherry yellows, ring spot and prune dwarf diseases; B. Effects--To determine effects of the viruses singly and in combination in the plum group and other stone fruit varieties, when the disease and causal viruses noted have been satisfactorily correlated; and C. Miscellaneous--To (1) continue study of conditions for which a causal factor proves difficult to ascertain; and (2) issue periodical reports for the benefit of the regional effort under project W-22.
Pl. Path., Ent., Hort. 290 (W-22) Coop. ARS

Ill. Inheritance and Breeding of Commercially Important Characters in the Peach. To (1) originate and introduce varieties with fruit bud hardiness maturing at closely spaced intervals throughout the season; and (2) study manner of transmission of characters from parents to offspring.
Hort. 65-324

Ill. Stone Fruit Virus Diseases and Their Control: Illinois. (1) Purify and characterize peach X-disease virus and cherry necrotic ring-spot virus; (2) diagnose stone fruit virus diseases by serological, physical, or chemical methods; (3) learn insect vectors of peach X-disease virus; (4) ascertain rate of spread of cherry necrotic ring-spot virus under orchard conditions and evaluate effect of ring-spot disease on fruit quality and yield on tree growth; (5) detect presence and learn severity of stone fruit virus diseases in nurseries or orchards and their environs.
Hort., Pl.Path. 68-372 (NC-14)

Iowa *Control of Virus Diseases in Nursery Stocks of Cherries and Other Stone Fruits*. To (1) maintain virus-free scion orchards of cherries; (2) develop virus-free Prunus mahaleb seed trees; (3) continue survey of virus contamination in scion stocks of plum varieties propagated in southwest Iowa nurseries; (4) establish virus-free plum variety scion orchards; (5) establish orchards of virus-free plum seed trees; (6) confirm seed transmission of necrotic ring spot in *P. americana*, perhaps other plum seed stock species; (7) learn rate of spread, if any, of virus in plum nursery blocks and scion and seed tree orchards; (8) learn latency and possibility of seed transmission of necrotic ring spot virus in *P. tomentosa*; and (9) explore possibility of virus contamination of nursery stocks of peaches and ornamental Prunus.

Bot., Pl. Path. 1060 (NC-14)

Kans. *Investigations of Virus Diseases of Stone Fruits*. To (1) develop methods by which cherry virus disease infection can be recognized under Kansas conditions; (2) determine what cherry viruses are present in Kansas both in cherry and other Prunus species; (3) devise means for producing virus-free propagating stock; and (4) develop procedure necessary for certifying virus-free cherry nursery stocks.

Bot. 318

Mass. *Infection Cycle and Control of Peach Canker Caused by the Fungus Fusicoccum Amygdali Delacroix*. To develop practical control measures for Peach Canker based on a comprehensive understanding of the causal organism.

Bot. 24

Mich. *Effect of Ring Spot and Yellows Viruses on the Anatomy and Physiology of Sour Cherry*. (1) Study if nutrition can overcome effect of ring spot and yellows on growth; (2) study symptomatology of virus infected trees in various nutrients; (3) analyze levels from different treatments for N.P.K. and amino acids; (4) study anatomy of leaves and other tissues infected with these viruses.

Bot., Pl. Path. 813

Mich. Virus Diseases Affecting Peach and Maintenance of Virus-Free Standard Peach Varietes. (1) Develop methods and materials for indexing; (2) learn presence or absence of and identitiy of latent viruses in peach; (3) host range of peach viruses and symptom expression in different hosts; (4) separation and identification of virus entities present in peach in North Central region and learn ability to incite disease singly and in combination; (5) economic importance of several diseases; (6) variability within viruses; (7) experimental transmission of viruses; (8) influence of environment on development and severity of diseases; (9) morphological, physiological and biochemical aspects of disease development; (10) chemical, and other methods of freeing plants and plant parts from virus infection and lessening injurious effects of viruses; (1) obtain and preserve elite sources of scions and rootstocks indexing as virus-free to be increased for experimental work and for commercial propagation of certified nursery stocks.

Pl.Path., & Bot. 820 (NC-14)

Minn. Stone Fruit Virus Diseases and Their Control. To (1) learn occurrence, distribution, severity and identification of viruses of hardy species of Prunus and hybrid varieties grown in Northern Great Plains; (2) learn effect of viruses on growth and yield of stone fruits; (3) study host range of viruses of Prunus; (4) study effect of environmental factors on expression of symptoms; (5) learn method of transmission and dissemination of viruses of hardy Prunus, especially in relation to insect vectors; (6) develop methods and materials for indexing viruses; and (7) learn resistance or tolerance of Prunus species and varieties to viruses present or that might affect hardy species.

Pl. Path. & Bot. 2223 (NC-14)

Mo. Stone Fruit Virus Diseases and Their Control. To (1) investigate new and different approaches to the problem of virus disease control including: continuation and extension of the indexing program; (2) fundamental studies of virus infection; (3) purification studies; and (4) chemotherapeutic studies.

Hort. 68 (NC-14)

Mo. Bacterial Spot, Brown Rot and Peach Scab Control and the Effect of Some of the Newer Pesticides Upon Fruit Finish of Peaches. To test promising synthetic organic fungicides as orchard sprays for effectiveness against brown rot, their phytotoxic effects and their value in control of peach scab; evaluating antibiotics which from in vitro tests have been found to be highly toxic to Xanthanomas pruni, for control of bacterial spot, and noting post harvest development of rots with different orchard fungicide programs.

Hort. 243

Mont. Viroses of Sweet and Sour Cherries in Montana. To study the occurrence, symptoms, spread and control of viroses of sweet and sour cherries in Montana, especially little cherry and bud and scion perpetuated diseases.
Bot. & Bact. MS 830

Mont. Iterrelation of Lambert Mottle and Latent Virus Complexes in Sweet Cherries. Learn effect, condition, and behavior of trees infected with Lambert mottle as symptom-expressing and as a latent virus on different varieties of sweet cherries; (2) learn possible occurrence of Lambert mottle on various native and cultivated species of Prunus; (3) study possible interrelation and combined effect on trees of Lambert mottle with other viruses; ring spot, sour cherry yellows, prune dwarf, mottle leaf, etc.; (4) study possible occurrence of strains in Lambert mottle virus; (5) identify vectors involved in spreading virus.
Hort., Bot. & Bact. 38 MS 967 (W-22)

Nebr. Serological Investigations of the Stone Fruit Viruses. Learn more specific means of isolating and identifying stone fruit viruses.
Pl. Path. 539 (NC-14)

N. J. Factors Involved in Susceptibility to and Infection of Peach by Fusicoccum Amygdali (Canker) and X. Pruni, (Bacterial Spot), and Ways of Controlling These Diseases. Canker. (1) Learn infection sites, and periods during which infection occurs; study (2) conditions which render these sites suitable infection courts, and changes that occur to impart resistance to them; (2) differences between varieties to account for differences in susceptibility; consider (4) ability of fungus involved to disolve and use various substrates; (5) effect of nutrition and winter injury on susceptibility and disease development; (6) value of fungicides and defoliation as controls; (7) develop suitable test procedures for rating peach seedlings as to susceptibility.
Pl. Path. 452

N. Y. (Cornell) Virus and Virus-Like Diseases of Tree Fruits.--1. X-Disease of Stone Fruits. To learn(1) if any transmission of X-disease virus occurs from 1 tree to another of the cultivated sorts, and if spread can occur only from choke cherry; (2) effect of rootstocks on symptom expression and on effect of virus on cherry tree; (3) relation of other viruses to X-disease virus, and their influence on expression of symptoms and on effect on tree.
Pl. Path., Pomol. 134-1 (NE-14)

N. Y.
(Cornell)

Virus and Virus-Like Diseases of Tree Fruits.--2. Diseases of Plum. To learn (1 & 2) nature of leaf-casting mottle of Fellenberg and bud-union constriction disease of Stanley prune so as to devise control method, nature of so-called asteroid spot of Myrobalan rootstock and its relation to constriction disease of Stanley prune and reduction in growth of other varieties; (3) establish budwood sources of Fellenberg free from leaf-casting mottle and establish Myrobalan seed-producing trees free from asteroid.

Pl. Path., Pomol. 134-2 (NE-14)

N. Y.
(Cornell)

Virus and Virus-Like Diseases of Tree Fruits.--3. Sour Cherry Yellows and Ring Spot of Stone Fruits. (1) Learn amount of damage by viruses in different species and varieties of stone fruits growing commercially in State, and compare susceptibility of different varieties of each species to viruses; (2) select the more resistant varieties for breeding stock; (3) learn relation of viruses to each other and other viruses; (4) learn influence of different rootstocks on disease effects; (5) learn relation of environmental conditions including soil factors and tree nutrition, to effects of diseases; (6) learn rate of spread in field in relation to variable environmental conditions with respect to cover crops, weeds, other tree species, and different climatic conditions; (7) use cross-protection tests to obtain information on relationships of viruses, and data on use of cross-protection.

Pl.Path., Pomol. 134-3 (NE-14)

N. Y.
(Cornell)

Virus and Virus-Like Diseases of Tree Fruits.--4. Production and Maintenance of Virus-Free Nursery Foundation Stock of Commercial Fruit Varieties. (1) Produce and maintain virus-free clones of various species and varieties of fruit trees, and establish healthy seed source trees for rootstock production; (2) improve present methods of indexing for determination of freedom from viruses.

Pl. Path., Pomol. 134-4 (NE-14)

N. Y.
(Cornell)

Virus and Virus-Like Diseases of Tree Fruit.--5. Transmission of Viruses that Affect Tree Fruits, and Their Insect Vectors. (1) Find and identify vector(s) of each of several important viruses causing diseases in stone fruits. Study insects to learn means of application of control measures. Study insect transmission which provides means of separating virus complexes.

Ent., Pl. Path., Pomol. 134-5 (NE-14)

Ohio

Stone Fruit Virus Diseases and Their Control. To (1) devise methods for detecting different virus diseases of stone fruits; (2) determine distribution and importance of various stone fruit virus diseases in Ohio; and (3) develop economical and effective measures for control of stone fruit virus diseases.
Bot. 85 (NC-14)

Oreg.

Virus and Similar Diseases of Orchard Trees. To determine identity and distribution of virus and virus-like diseases of orchard trees.
Ent., Pl. Path. 44

Oreg.

Non-Virus Diseases Attacking Cherries and Other Stone Fruits. (1) Learn occurrence, cause, and possible control of diseases of sweet cherries known as "dead bud"; (2) study life cycle and control of bacterial canker as incited by Pseudomonas syringae; (3) initiate studies on non-virus decline, early fall coloration, and leaf roll of Montmorency cherry; (4) study effect and control of silver leaf incited by Stereum purpureum on fruit trees; (5) learn possibility of controlling Armillaria root rot of cherries under Oregon conditions; (6) study other orchard disease problems apparently not incited by viruses.
Bot., Pl. Path. 92

Pa.

Virus Diseases of Stone Fruits. (I) Identify specific virus entities associated with yellows disease of sour cherry, and X yellows diseases of peach; (2) learn effects on host of each virus alone or in combination; (3) formulate feasible methods of disease control.
Bot. & Pl. Path. 1122 (NE-14)

S. C.

Importance of Xanthomonas Pruni Cankers on Peach Trees as a Source of Infection. To learn (1) time of formation and development of bacterial cankers on peach trees; (2) dissemination of bacteria from cankers following spring and environmental conditions which favor their spread.
Pl. Path. 28 Coop. AEC

S. C.

Identification and Control of Parasitic Nematodes Affecting Peach Trees in South Carolina. (1) By orchard survey, learn species of nematodes present and responsible for fruit decline; (2) learn relation between peach rootstocks and parasitic nematodes; (3) compare relative effectiveness of several nematocides as preplant fumigants; (4) compare relative effectiveness of several nematocides as post-plant fumigants on established trees and learn most effective way of using.
Bot.& Bact. 342 (S-19)

Utah Virus and Virus-Like Diseases of Stone Fruits. To (1) identify and characterize the virus and virus-like diseases responsible for the degeneration of stone fruit orchards of Utah; (2) discover host ranges and symptom expressions of the various viruses in Utah's stone fruits; (3) learn etiology of little-understood stone fruit diseases; (4) learn the physical, chemical, and biological properties of the various stone fruit viruses; (5) devise diagnostic tests for the various stone fruit viruses in different suscepts; (6) learn insect vectors and other means of natural dissemination of the stone fruit viruses; (7) perfect effective means of economic control of these virus diseases; (8) select and propagate virus-free clones of important commercial varieties of stone fruits and their rootstocks on their own roots; and (9) grow these virus-free selections in an isolated repository plot at Logan from which they will be made available to the nursery industry for the establishment of budwood mother blocks.

Pl. Path., Bot. 318, Coop. AEC

Utah The Physical and Chemical Properties of Ring Spot, Sour Cherry Yellows and Prune Dwarf Viruses. To (1) isolate viruses causing ringspot, sour cherry yellows and prune dwarf diseases of stone fruits; (2) learn size, shape, isoelectric point, and chemical composition of isolated viruses; and (3) attempt to demonstrate infectivity of these viruses on suitable susceptible host plants.

Bot. 466 (W-22)

Wash. Determine the Prevalence of Sour Cherry Yellows and Ring Spot Viruses in Mazzard, Mahaleb and Myrobalan Seed Sources in the Pacific Northwest. To determine the prevalence of sour cherry yellows and ring spot viruses in Mazzard, Mahaleb, and Myrobalan seed sources in the Pacific Northwest and to establish seed sources free of these diseases for experimental and commercial use.

Pl.Path. 1232 (W-22)

Wash. Obtaining and Preserving Virus-Free Deciduous Tree Fruit Stocks. To outline and designate the responsibilites of the agencies (Dept. of Plant Pathology, Irrigation Exp. Station, Plant Introduction and Quarantine Station, Washington State Department of Agriculture) relative to the operation of project IR-2

Pl. Path. 1262 (IR-2) Coop. ARS

W. Va. Virus Diseases of Sour Cherry and Other Stone Fruits. To learn (1) rate of spread of cherry virus diseases; (2) method of spread of stone fruit viruses in general with reference to possible insect vectors of cherry yellows and ringspot; (3) effect on yield and tree growth caused by viruses of sour cherry; (4) attempt to locate virus-free sources of Mazzard cherry seed for commercial propagation.
Hort., Pl. Path. 89 (NE-14)

Wis. Stone Fruit Virus Diseases and Their Control. To develop a basis and methods for effective control of stone fruit virus diseases, with special reference to those that occur in Wisconsin or are thought to be a menance to Wisconsin in stone fruit culture.
Pl.Path. 301b (NC-14) Coop. ARS

Citrus and Other Subtropical Fruits

Ariz. Control of Root Diseases and Virus Diseases of Citrus. (1) Perfect methods of protection from, and control of, dry-root rot of citrus; (2) treat trees infested by citrus nematodes by eradication or control of nematodes; disinfect soils of citrus nematodes before replanting; (3) establish sources of budwood of superior varieties of lemons and other citrus which can be certified as free from virus or other infectious diseases.
Pl. Path. 222

Ariz. Wood-Necrosis Gummosis of Citrus. To learn (1) organism or agent causing Wood-necrosis Gummosis in Arizona; (2) field or laboratory symptoms which can be relied upon to distinguish Wood-necrosis Gummosis from all similar diseases; (3) effect of disease on yield, fruit quality, rate of growth and longevity of Marsh Seedless grapefruit; (4) develop methods of protecting citrus trees from infection; (5) method for treating infected trees.
Pl. Path. 407 Coop. ARS

Calif. Effect of Water and Nutrient Level on Development of Omphalia Root Rot of the Date Palm. To (1) determine effect of 2 levels of soil moisture and 2 to 4 levels of nutrition on development of Omphalia root rot in controlled inoculation experiments, as there is evidence that adequate water and perhaps nutrients will minimize injurious effects of Omphalia; (2) answer such questions as: extent of injury to commercial palms inoculated with Omphalia, is harmful effect minimized when trees received adequate water and nutrients, or accentuated when they receive inadequate water and nutrients, etc., and (3) continue to maintain Mecca plot for at least 5 more years.
Pl. Path. 878-A

Calif. The Growth of Citrus and Other Crops as Affected by Minor Elements. To (1) develop methods of sufficient sensitivity for detection and estimation of Co, Cr, Ni, V, etc.; (2) investigate requirements of citrus and other crops for these and other elements and determine symptoms in deficiences; (3) study toxic effects of various elements on crops; (4) study methods of application for essential minor elements and effects of treatment upon yield, growth, etc., of plants; and (5) study effects of variation in supply of minor elements upon absorption of major essential elements.
Soils & Pl. Nutr. 1025

Calif. The Citrus Psorosis Diseases. (1) Obtain further knowledge of different types of psorosis, their economic importance and control or prevention, and the nature and properties of their causal viruses; (2) investigate virus strains and interactions between virus strains; (3) at cellular level, study initiation and development of virus-induced bark lesions on psorosis-infected citrus trees.
Pl. Path. 1082

Calif. Pathological Investigations: Transmission, Symptomatology, Host Range, Histology, Prevention or Control and Other Studies of the So-Called Orange Tree Quick Decline (Tristeza) Disease and its Causal Virus. Maintain studies on causal virus; (1) purification and isolation, electron microscopy, thermal properties, possible inactivation of virus in host by heat treatment, mechanical transmission; (2) host range within citrus family, symptomless hosts, hosts other than citrus; (3) susceptibility of citrus seedlings and "tolerant" scion-stock combinations to stem-pitting phase of disease; (4) anatomical effects of virus on infected trees, anatomy of stem pitting, effects of different strains of virus; (5) virus strains, degrees of virulence, cross-protection between strains, "seedling yellows" and its relation to quick decline; (6) combined infections of quick decline and psorosis viruses; (7) cooperate with State Department of Agriculture in learning distribution of disease and establishing quarantine boundaries. Use mild strains of virus as a control.
Pl.Path. 1376

Calif. Orange-Tree Quick Decline: Rootstock Scion Relations Affecting Its Occurrence and Prevention. Methods to be used include determination of the susceptibility to quick decline of commercial citrus scions on various rootstocks, topworking to non-susceptible tops, inarching with resistant rootstocks, and rootstock identification in investigation of: (1) degree of susceptibility of various stock-scion combination including sweet orange, lemons, grapefruit, and miscellaneous scion varieties on sour orange stock; (2) the effects of top working susceptible sweet orange trees to other species of citrus including degree of response after topworking trees which are (3) the effects of substituting resistant rootstocks for susceptible sour orange roots on sweet orange trees by inarching; and (4) identification of rootstocks.

Hort. 1382

Hawaii Improvement of Commercial Strains of Papaya (Carica Papaya L.). (1) Develop improved commercial strains of papaya for fresh fruit market and for processing by means of cross breeding, inbreeding, and selection; (2) learn genetics of tree and fruit characters as disease resistance, fruit size, shape, quality, firmness, color, and seed cavity size.

Hort. 173

Nuts

Tex. Foliage Diseases of Pecans and Their Control. To develop (1) an effective spray or dust program for the control of prevalent foliage diseases of the pecan;and (2) test fungidicdes that will be compatable with commonly used insecticides and which will not result in increased insect populations.

Pl. Physiol. & Path., Ent. 736

REGIONAL PROJECTS

IR-2 **Obtaining and Preserving Virus-Free Deciduous Tree Fruit Stocks.** (1) To assemble all apparently virus-free selections of desirable species and varieties of deciduous tree fruit stocks and, when verified to be free of viruses by accepted indexing procedures, to establish and maintain them in isolated repositories; (2) to establish a research unit designed to study present indexing techniques for virus detection and attempt to develop better or more efficient methods; (3) to study possible methods of eliminating viruses from contaminated stock where clean propagating material is not available; (4) to distribute uniform virus-free propagating materials for foundation stock to cooperating investigators for use in research or for release to the industry.

Cooperating stations and agencies: Federal-grant project - Wash., ARS

NC-14 **Stone Fruit Virus Diseases and Their Control.** (1) To determine the occurrence and geographical range of stone fruit virus diseases and their variations in symptom expression on different hosts and under different climatic conditions in the North Central Region; (2) to devise reliable methods of detecting the presence of latent viruses in stone fruits and to determine their distribution in the North Central Region; (3) to separate and identify the stone fruit virus entities present in the North Central Region and to determine their ability to incite disease singly and in combinations; (4) to determine the host ranges and the modes of transmission and dissemination of the viruses of stone fruits and to acquire other essential information; (5) to devise economical and effective measures for the control of stone fruit virus diseases in the North Central Region.

Cooperating stations and agencies: Federal-grant projects - Ill., Ind., Iowa, Mich., Minn., Mo., Nebr., Ohio, Wisc., ARS

NE-14 **Virus Diseases of Deciduous Tree Fruits and Their Control.** (1) To establish the virus entity or entities inciting specific diseases of deciduous tree fruits and to determine their relationship and economic importance; (2) to determine the epidemiology of such virus diseases and to identify their principal vectors; (3) to devise practicable and economic methods of deciduous fruit virus diseases.

Cooperating stations and agencies: Federal-grant projects - Maine, N. H., N. Y. (Cornell), N.Y. (Geneva), Pa., W. Va.

W-22 **Behavior and Effects of the Virus Complexes Latent in Stone Fruit Varieties and Rootstocks.** To determine the presence, effects, and interaction of latent and symptom-expressing viruses in stone fruit stocks.

Cooperating stations and agencies: Federal-grant projects - Calif., Colo., Idaho, Mont., Oreg., Utah, Wash., ARS

OTHER REGIONAL RESEARCH PROJECTS REFERRED TO IN THIS SUMMARY BUT SUMMARIZED ELSEWHERE

NC-7	New Plants - The Introduction, Multiplication, Preservation and Evaluation of New Plants for Industrial and Agricultural Use. See Part 12
NE-9	Discovery and Preservation of Valuable Plant Germ Plasm. See Part 12
NE-34	Biology and Control of Nematodes Associated With Plant Diseases. See Part 17, Section a
S-19	Plant Parasitic Nematodes. See Part 12
W-6	The Introduction, Multiplication, Preservation, and Determination of Potential Value of New Plants. See Part 12

LIST OF COMPILATIONS OF FEDERAL-GRANT RESEARCH PROJECTS AT STATE AGRICULTURAL EXPERIMENT STATIONS

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
1	Agricultural Chemistry	Agricultural Chemistry
2	Agricultural Economics	a. Prices, Incomes, & General Studies of Commodities & Industries b. Farm Management c. Land Economics d. Farm Finance & Taxation
3	Agricultural Engineering	a. Land & Water Use & Development b. Power Machinery & Equipment c. Farm Structures & Materials
4	Animal Husbandry	a. Beef Cattle b. Sheep & Goats c. Swine
5	Dairy Husbandry	Dairy Cattle
6	Dairy Technology	Dairy Technology
7	Entomology & Economic Zoology	a. Field Crop Insects b. Fruit, Nut & Vegetable Insects c. Miscellaneous Insects & Economic Zoology d. Insecticides
8	Field Crops	a. Cereal Crops b. Oil, Fiber, Tobacco & Sugar Crops
9	Food Science & Technology	a. Food Chemistry, Microbiology, Sanitation & Public Health b. Food Engineering, Processing, Product and Process Development, Utilization and Waste Disposal c. Food Quality & Standards, Acceptance, Preference, & Marketing
10	Forage Crops, Pastures & Ranges	Forage Crops, Pastures & Ranges
11	Forestry	Forestry

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
12	Fruits & Nuts	Fruits & Nuts
13	Home Economics	a. Human Nutrition
		b. Housing
		c. Clothing & Textiles
		d. Foods-Consumer Quality & Utilization
		e. Household Economics & Management
14	Economics of Marketing	a. Field Crops
		b. Fruits & Vegetables
		c. Livestock, Meats & Wool
		d. Dairy Products
		e. Poultry & Poultry Products
		f. Forest Products & Ornamental & Drug Plants
		g. Cross-Commodity & Functional Studies
15	Meteorology	Meteorology
16	Ornamental & Drug Plants	Ornamental & Drug Plants
17	Plant Pathology & Bacteriology	a. Plant Pathology, Botany, & Diseases of Miscellaneous Crops
		b. Diseases of Field Crops
		c. Diseases of Fruit Crops
		d. Diseases of Vegetable Crops
18	Plant Physiology & Nutrition	Plant Physiology & Nutrition
19	Poultry Industry	Poultry Industry
20	Rural Sociology	Rural Life Studies
21	Soils	a. Soil Chemistry & Microbiology
		b. Soil Fertility, Management & Soil-Plant Relationships
		c. Soil Physical Properties, Conservation & Classification
22	Vegetables	a. Vegetable Crops
		b. Potatoes
23	Veterinary Science	Veterinary Science
24	Weeds	Weed Control